

REMARKS

Applicants appreciate the Examiner's thorough consideration provided in the present application. Claims 1-8 are now present in the application. Claims 1-3 have been amended. Claim 8 has been added. Claim 1 is independent. Reconsideration of this application, as amended, is respectfully requested.

Drawings

It is gratefully appreciated that the Examiner has accepted the formal drawings.

Priority Under 35 U.S.C. §119

Applicants thank the Examiner for acknowledging Applicants' claim for foreign priority under 35 U.S.C. §119, and receipt of the certified priority document.

Information Disclosure Citation

Applicants thank the Examiner for considering the references supplied with the Information Disclosure Statements filed on June 1, 2006, and for providing Applicants with an initialed copy of the PTO-1449 forms filed therewith.

Amendments to the Claims

As the Examiner will note, minor changes have been made to claims 1-3, without affecting the scope thereof, to place them in better form for U.S. practice.

The Examiner is respectfully requested to enter and approve these amendments.

Claim Rejections Under 35 U.S.C. §§ 102 and 103

Claims 1-5 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Kodaira, U.S. Patent No. 6,427,799. Claims 6 and 7 stand rejected under 35 U.S.C. § 103 (a) as being unpatentable over Kodaira in view of Cheng, U.S. Patent No. 6,155,376. These rejections are respectfully traversed.

Complete discussions of the Examiner's rejections are set forth in the Office Action, and are not repeated herein. Applicants respectfully submit that independent claim 1 clearly defines the present application over the references relied on by the Examiner.

In particular, independent claim 1 now recites a combination of elements including "a housing for supporting coaxially to a steering shaft and a rotating cylinder, said rotating cylinder being provided with *a screw mechanism constructed between said rotating cylinder and said steering shaft* for moving in an axial direction for the purpose of steering and being rotated by a transmission from a steering motor, said steering motor being constructed in a separated form consisting of first and second housings, *said first and second housings being fit to each other by a spigot-joint fitting on an outer side of a retaining part of a thrust bearing for thrust-supporting said rotating cylinder*, wherein *a gap is provided in a part that constitutes a part of the spigot-joint fitting part of said first and second housings and that is located on an outer side of a fixing nut screwed into said retaining part in order to apply a tightening force on said thrust bearing from one side.*" Applicants respectfully submit that the combination of elements set forth in claim 1 is not disclosed or suggested by the references relied on by the Examiner.

Specifically, the Examiner refers to the housings A and B of Kodaira as the first and second housing of the present application; Applicants respectfully disagree. In the present

application, *“said first and second housings being fit to each other by a spigot-joint fitting on an outer side of a retaining part of a thrust bearing for thrust-supporting said rotating cylinder”* is recited in claim 1. Specifically, referring to Fig. 3 of the present application, the outer periphery of the retaining ring 81 of the thrust bearing 8 is used as a spigot-joint fitting part for connection with the first housing 17. That is, in the inner surface of an end part of the connection side with the second housing 18, a fitting part 19 is provided around along a predetermined length. Further, as shown in the figure, in the first and the second housings 17 and 18, the retaining ring 81 of the second housing 18 is fit into a fitting part 19 of the first housing 17, so that both housings 17 and 18 are linked with concentricity by the effect of the fitting part. It is noted that the outer periphery surface of the retaining ring 81 is fit into the fitting part 19 by spigot-joint fitting.

On the contrary, however, referring to Fig. 2 and Col. 5, lines 18-36 of Kodaira, the housing A and the housing B in Kodaira are coupled by fitting the threaded portions formed thereon respectively. Specifically, the female threaded portion 36 is formed on the left end portion of the yoke 7 that is integrally cast with the housing A, and the male threaded portion 37 is formed on the right end portion of the housing B. As such, by screwing the male threaded portion 37 on the housing B into the female threaded portion 36 on the housing A, the housing A and the housing B are coupled. Clearly, in Kodaira, the housings A and B are **not** coupled by a spigot-joint fitting on an outer side of a retaining part of a thrust bearing as the first and second housings of the present application are. In addition, the Examiner fails to indicate which element in Kodaira can be referred to as the thrust bearing and the retaining part of the thrust bearing set forth in claim 1. Therefore, Applicants respectfully submit that Kodaira fails to teach or suggest

“said first and second housings being fit to each other by a spigot-joint fitting on an outer side of a retaining part of a thrust bearing for thrust-supporting said rotating cylinder” as recited in claim 1.

Further, the Examiner refers to the armature shaft 11 of Kodaira as the rotating cylinder of the present application, and refers to the nut section 19 of Kodaira as the fixing nut 82 of the present application; Applicants respectfully disagree.

First, in the present application, the rotating cylinder is provided with *a screw mechanism constructed between said rotating cylinder and said steering shaft* for moving in an axial direction for the purpose of steering as recited in claim 1. Specifically, referring to Fig. 2 of the present application, in an inner periphery surface of the ball nut 51, a screw groove having a semicircular cross section is formed. This screw groove and the screw groove 50 in the outer periphery of the rack shaft 1 engage with each other via a large number of balls 52, 52, ..., and thereby constitute a ball screw mechanism 5. By contrast, the armature shaft 11 of Kodaira asserted by the Examiner is a part of the electric motor 1 and is disposed in the cylindrical yoke 7, and the rack-shaft 2 is assembled to run through the inside of the armature shaft. Clearly, no figure and disclosure in Kodaira shows that a screw mechanism is provided between the armature shaft 11 and the rack-shaft 2. Instead, a ball screw mechanism 3 is provided between the nut section 19 and the rack-shaft 2, which is different from the structure of the present application. Thus, Applicants respectfully submit that Kodaira fails to teach or suggest “said rotating cylinder being provided with *a screw mechanism constructed between said rotating cylinder and said steering shaft* for moving in an axial direction for the purpose of steering and being rotated by a transmission from a steering motor” as recited in claim 1.

Second, it is noted that claim 1 includes the recitations of “*a thrust bearing for thrust-supporting said rotating cylinder*” and “*a fixing nut screwed into said retaining part in order to apply a tightening force on said thrust bearing from one side.*” Specifically, referring to Fig. 3 of the present application, the retaining part 81 of the thrust bearing 8 is provided for supporting one side of the ball nut 51. The outer race of the thrust bearing 8 is fit into the retaining ring (retaining part) 81 attached around an end part of the connection side with the first housing 17 of the second housing 18. Then, a fixing nut 82 screwed into the screw groove in the inner surface of the opening side of the retaining ring 81 is tightened to one side of the outer race, so that said outer race is pinched between the fixing nut 82 and a step 83 on the inner far side of the retaining ring 81.

However, on the contrary, referring to Col. 4, lines 41-46 of Kodaira, the armature shaft 11 of Kodaira is held at an end thereof by the bearing 17 which is fitted to the housing A, and provided on the other end with a tapered spline, which is engaged with a corresponding spline formed at an end of the nut section 19 of the ball screw mechanism 3. That is, in Kodaira, it is the bearing 17 that supports the armature shaft 11. However, the bearing 17 of Kodaira cannot be comparable with the thrust bearing for supporting the rotating cylinder of the present application, because, Kodaira fails to teach or suggest “*a fixing nut screwed into said retaining part in order to apply a tightening force on said thrust bearing from one side*” as recited in claim 1. In particular, the Examiner refers to the nut section 19 of Kodaira as the fixing nut 82 of the present application; however, the nut section 19 cannot provide a tightening force on the bearing 17 from one side as the fixing nut of the present application does. In addition, it is noted that the nut section 19 of Kodaira rotates for transmitting the rotary power to the rack-shaft 2. By contrast,

the fixing nut of the present application needs to be fixed firmly in a manner unmovable in the axial direction of the thrust bearing. Therefore, it is clear that the nut section 19 of Kodaira cannot be equivalent to the fixing nut of the present application, and that the bearing 17 of Kodaira cannot be equivalent to the thrust bearing of the present application.

On page 3 of the Office Action, the Examiner refers to the angular bearing 4 of Kodaira as the thrust bearing of the present application; Applicants respectfully disagree. Specifically, referring to Col. 5, lines 6-9 of Kodaira, it is clearly recited that the nut section 19 and the angular bearing 4 are combined to form a unitary member and arranged in the housing B. Therefore, it is impossible for the nut section 19 to apply a tightening force on the angular bearing 4 from one side. In view of above, Applicants respectfully submit that Kodaira fails to teach or suggest “a thrust bearing for thrust-supporting said rotating cylinder” and “a fixing nut screwed into said retaining part in order to apply a tightening force on said thrust bearing from one side” as recited in claim 1.

Further, the Examiner refers to the caulking groove 38 of Kodaira as the gap of the present application; Applicants respectfully disagree.

Specifically, in the present invention, the gap is “*provided in a part that constitutes a part of the spigot-joint fitting part of said first and second housings and that is located on an outer side of a fixing nut screwed into said retaining part in order to apply a tightening force on said thrust bearing from one side*” as recited in claim 1. In particular, referring to Fig. 3 of the present application, in the outer periphery surface of the retaining ring 81 which is fit into the fitting part 19 by spigot-joint fitting, a small diameter part 84 is formed that is fabricated into a smaller diameter than other parts. As shown in the figure, the small diameter part 84 is provided such as

to ensure a predetermined gap C between itself and the inner surface of the fitting part 19 along a length range approximately equal to the screwing region of the fixing nut 82 in the inner side starting from the tip part on the opening side of the retaining ring 81. As such, the increase of the diameter of the spigot-joint fitting part of the outer periphery of the retaining ring 81 arises in the small diameter part 84 provided in correspondence to the screwing region of the fixing nut 82, and is hence absorbed within the range of the gap C between itself and the inner surface of the fitting part 19.

On the contrary, as can be seen from Fig. 3 and the corresponding disclosure of Kodaira, the caulking groove 38 of Kodaira **cannot** be *“a part of the spigot-joint fitting part of said first and second housings”* as set forth in the present application, and also, the caulking groove 38 of Kodaira is **not** located on an outer side of the nut section 19, which was referred to as the fixing nut of the present application, as set forth in claim 1. Therefore, Applicants respectfully submit that Kodaira fails to teach or suggest *“a gap is provided in a part that constitutes a part of the spigot-joint fitting part of said first and second housings and that is located on an outer side of a fixing nut screwed into said retaining part in order to apply a tightening force on said thrust bearing from one side”* as recited in claim 1.

With regard to the Examiner's reliance on Cheng, this reference has only been relied on for its teaching of the pinion. Applicants respectfully submit that Cheng also fails to disclose the above-mentioned features set forth in claim 1, and thus fails to cure the deficiencies of Kodaira.

Since Kodaira and Cheng, either taken alone or in combination, fail to teach each and every claimed feature as recited in claim 1, Applicants respectfully submit that claim 1 clearly defines over the teachings of the references relied on by the Examiner.

In addition, claims 2-7 depend, either directly or indirectly, from independent claim 1, and are therefore allowable based on their respective dependence from independent claim 1, which is believed to be allowable.

In view of the above amendments to the claims and remarks, Applicant respectfully submits that claims 1-7 clearly define the present invention over the references relied on by the Examiner. Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. §§ 102 and 103 are respectfully requested.

Additional Claims

Claim 8 has been added for the Examiner's consideration. Support for this amendment can be found at least at, for example, Fig. 3 of the Specification as originally filed. Thus, no new matter has been added.

Applicants respectfully submit that claim 8 depends directly from independent claim 1, and is therefore allowable based on its dependence from independent claim 1, which is believed to be allowable, as well as due to the additional novel features set forth therein.

Specifically, claim 8 recites "said gap that constitutes a part overlaps, in an axial direction, with a screwing region between said retaining part and said fixing nut screwed into said retaining part." First, as mentioned above, the caulking groove 38 of Kodaira cannot be comparable with the gap of the present application. Second, the Examiner fails to indicate which element in Kodaira can be equivalent to the retaining part of the present application. In fact, Kodaira fails to teach "a screwing region between said retaining part and said fixing nut screwed into said retaining part" and thus fails to teach "said gap that constitutes a part overlaps, in an

axial direction, with a screwing region” as recited in claim 8. For this additional reason, Applicants respectfully submit that claim 8 clearly defines over the references relied on by the Examiner.

Favorable consideration and allowance of claim 8 are respectfully requested.

CONCLUSION

It is believed that a full and complete response has been made to the Office Action, and that as such, the Examiner is respectfully requested to send the application to Issue.

In the event there are any matters remaining in this application, the Examiner is invited to contact Paul C. Lewis, Registration No. 43,368 at (703) 205-8000 in the Washington, D.C. area.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.147; particularly, extension of time fees.

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Respectfully submitted,

By 

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